## Part 1 General

### 1.1 REFERENCES

.1 CSA C22.2 No. 152, Combustible Gas Detection Instruments.

.2 Canadian Electrical Code, Part 1, CSA - C22.1

### 1.2 STORAGE

.1 Store gas detection instruments in their original shipping containers in a dry location that is free of fumes and vapours. Never store an instrument in an area where desensitizing agents (such as paint or silicone) may be present.

### 1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with section 01 33 00 - Submittal Procedures.

.1 Detailed shop drawings including panel layouts and wiring diagrams are required for the sample panel.

## Part 2 Products

### 2.1 GENERAL

.1 All gas detection products to be supplied from the same manufacturer.

.2 Manufacturer: Draeger.

.1 Alternative manufacturers will not be accepted due to this product having been selected as the plant standard.

### 2.2 CONTROLLER

.1 Requirements:

.1 Microprocessor based.
.2 Power Supply: 120 VAC
.3 Enclosure: NEMA 4X Fiberglass
.4 Mounting: Wall
.5 Operating Temperature range: 0°C to 40°C.
.6 Operating Humidity: 0-90% RH, non-condensing
.7 Input Channels:
.1 Each Controller is to be capable of supporting up to 16 channels.
.2 Capability may be provided via an internal add-on module.
.3 Minimum channels in supplied units: 8
.4 Input Signal: 4-20 mA
.5 Configurable for gas, range, and units.

.6 Power for input channels supplied by controller.

.8 Alarms:

.1 Two levels of programmable alarms per channel, with two independent setpoints per channel

.9 Output:

.1 Capable of one 4-20 mA output per channel.

**.2** Capability may be provided via an internal add-on module.

.10 Display

.1 Alphanumeric display configurable for:

.1 0.1 through 8,000 ppm for ppm levels, and

.2 0-100% for percentage levels.

.2 Allow viewing of all active channels simultaneously.

.3 Provide LED display of all channel alarms.

.1 One LED for Alarm 1.

.2 One LED for Alarm 2.

.3 One LED for Fault.

.11 Alarm Relays:

.1 All relays to be Form C, SPDT.

.2 Contacts rated for 5A at 30 VDC and 240VAC

.3 Configurable for fail-safe operation, where relays are normally energized.

.4 Configurable for latching or non-latching operation.

.5 Capability may be provided via an internal add-on module.

.6 Configurable for zoning together of input channels.

.7 Zoning to be configured as per drawings.

.12 Configuration:

.1 All configuration to be available from the unit front display, without requiring the enclosure to be opened.

.2 Password protected.

.3 Store data in non-volatile memory. Battery backed RAM for storing configuration data is not acceptable.

.13 Communication:

.1 Modbus RS-485 master or slave.

.2 Provide registers to access each channel gas level, as well as all alarm status indications.

.3 Register map to be fully documented and made available.

.14 Approvals:

.1 C22.2 No. 152.

.15 Manufacturer and Model: Draeger DraegerGard.

## 2.3 GAS DETECTOR

.1 $H_2S$ Detector Requirements:

.1 Sensor

.1 The sensor of the gas detector shall be based on electrochemical principles.

.2 Sensor specifications include:

.1 Operating Temperature: -40°C to 65°C.

.2 Operating Humidity: 0-99% RH, non-condensing

.3 Measurement range: **0 – 50 ppm**.

.3 Sensor to be temperature compensated and able to operate within ambient temperature range.

.4 Sensor to contain on-board data memory capability which contains sensor type, part number, serial number, manufacture date and date of initial installation. Additionally it must contain calibration data such as zero, sensitivity and date of last calibration.

.5 Sensor to have capability for full calibration at a remote location (e.g. instrument shop) and then installed in field transmitters without further calibration required.

.6 Field replacement of sensor to be accomplished without the need to declassify the area or the need to turn off the entire system.

.2 Transmitter

.1 Transmitter must accept, recognize, and upload calibration data of a remotely calibrated sensor without the need to repeat configuration and/or calibration.

.2 Transmitter shall have a two line alphanumeric backlit LCD display with user selectable language options (English).

.3 Transmitter shall be microprocessor controlled and perform self-diagnostics with error detection and alphanumeric messages displayed on the LCD.

.4 Transmitter to produce 4 to 20 mA output for point-to point connection, and have HART® capability.

.5 Notwithstanding C13 the transmitter shall have a 1.5 year warranty.

.6 Transmitter shall have an option for on-board, user programmable relays.

.7 Transmitter to allow for non-intrusive, one-man, password protected calibration using transmitter pushbuttons, infrared remote control, HART handheld terminal, or HART controller.

.8 During calibration or configuration of the gas detector, a signal shall be transmitted to the central control system indicating that a calibration or configuration is in progress. The signal shall be compatible with standard equipment, not requiring a manufacturer specific interface.

.9 The transmitter shall meet or exceed the following specifications:

.1 Housing Material shall be a copper free aluminum enclosure with polyester powder paint coat (thermally treated)

.2 Signal Current: 4 mA to 20 mA

.3 Fault < 3.2 mA

.4 Supply Voltage: 10 to 32 VDC

.5 Power Input 100 mA @ 24 VDC

.6 Display

.1 LCD display

.2 Display gas concentration to within 1% of range.

.7 Remote Sensor:

.1 Provide capability to mount sensor remote from transmitter. Minimum distance to be 5m.

.8 Temperature range: –40°C to 65°C (–40 to 150° F)

.9 Approvals: Explosion proof UL, CSA

.1 Class I, Div 1, Groups B, C, D

.10 Protection: NEMA 7

.11 Connection: 2 ¾" NPT female conduit entries

.3 Manufacturer and Model: Draeger Polytron 2XP Tox with $H_2S$ LC Sensor

**.2 $O_2$ Detector Requirements:**

**.1 Sensor**

**.1 The sensor of the gas detector shall be based on electrochemical principles.**

**.2 Sensor specifications include:**

**.1 Operating Temperature: -40°C to 65°C.**

**.2 Operating Humidity: 0-99% RH, non-condensing**

**.3 Measurement range: 0 – 25 %**

**.3 Sensor to be temperature compensated and able to operate within ambient temperature range.**

**.4 Sensor to contain on-board data memory capability which contains sensor type, part number, serial number, manufacture date and date of initial installation. Additionally it must contain calibration data such as zero, sensitivity and date of last calibration.**

**.5 Sensor to have capability for full calibration at a remote location (e.g. instrument shop) and then installed in field transmitters without further calibration required.**

**.6 Field replacement of sensor to be accomplished without the need to declassify the area or the need to turn off the entire system.**

**.2 Transmitter**

**.1 Transmitter must accept, recognize, and upload calibration data of a remotely calibrated sensor without the need to repeat configuration and/or calibration.**

**.2 Transmitter shall have a two line alphanumeric backlit LCD display with user selectable language options (English).**

**.3 Transmitter shall be microprocessor controlled and perform self-diagnostics with error detection and alphanumeric messages displayed on the LCD.**

**.4 Transmitter to produce 4 to 20 mA output for point-to point connection, and have HART® capability.**

**.5 Notwithstanding C13 the transmitter shall have a 1.5 year warranty.**

**.6 Transmitter shall have an option for on-board, user programmable relays.**

**.7 Transmitter to allow for non-intrusive, one-man, password protected calibration using transmitter pushbuttons, infrared remote control, HART handheld terminal, or HART controller.**

**.8 During calibration or configuration of the gas detector, a signal shall be transmitted to the central control system indicating that a calibration or configuration is in progress. The signal shall be compatible with standard equipment, not requiring a manufacturer specific interface.**

**.9 The transmitter shall meet or exceed the following specifications:**

**.1 Housing Material shall be a copper free aluminum enclosure with polyester powder paint coat (thermally treated)**

**.2 Signal Current: 4 mA to 20 mA**

**.3 Fault < 3.2 mA**

**.4 Supply Voltage: 10 to 32 VDC**

**.5 Power Input 100 mA @ 24 VDC**

**.6 Display**

**.1 LCD display**

**.2 Display gas concentration to within 1% of range.**

**.7 Remote Sensor:**

**.1 Provide capability to mount sensor remote from transmitter. Minimum distance to be 5m.**

**.8 Temperature range: –40°C to 65°C (–40 to 150° F)**

**.9 Approvals: Explosion proof UL, CSA**

**.1 Class I, Div 1, Groups B, C, D**

**.10 Protection: NEMA 7**

**.11 Connection: 2 ¾" NPT female conduit entries**

**.3 Manufacturer and Model: Draeger Polytron 2XP Tox with $O_2$ LS Sensor**

.3 IR Hydrocarbon Detector

.1 The combustible gas detector shall be based on infrared absorption principle incorporating both a double-compensated optical bench (2 lamps, 2 detectors) and non-focusing optics design. Measurement range shall be 0 to 100% LEL;

.2 The gas detector shall be microprocessor controlled and perform self-diagnostics with error detection.

.3 Recommended time between calibrations to exceed 24 months.

.4 Capability for remote calibration with both remote gas and HART connection.

.5 Transmitter to produce 4 to 20 mA output for point-to point connection and HART® signal.

.6 Transmitter to allow for non-intrusive, one-man, password protected calibration using a HART handheld terminal or HART controller.

.7 Calibration/configuration menu language to be user selectable (English).

.8 During calibration or configuration of the gas detector, a signal shall be transmitted to the central control system indicating that a calibration or

configuration is in progress. The signal shall be compatible with standard equipment, not requiring a manufacturer specific interface.

.9 Notwithstanding C13 the transmitter shall have a 5 year warranty.

.10 The gas detector shall meet or exceed the following specifications:

.1 Housing Material: Stainless steel SS316

.2 Signal Current 4 mA to 20 mA

.3 Fault <3.2 mA

.4 Supply Voltage: 15 to 32 V DC

.5 Power Input 200 mA @ 24 VDC

.6 Temperature range: –40°C to 65°C (–40 to 150° F)

.7 Approvals: Explosion proof UL, CSA

.1 Class I, Div 1, Groups B, C, D

.8 Approvals: Explosion proof UL, CSA

.1 Class I, Div 1, Groups B, C, D

.9 Protection: NEMA 7

.10 2 ¾" NPT female conduit entries

.11 Manufacturer and Model: Draeger Polytron IR.

.4 Accessories

.1 Splash guard

.2 Mounting kit for Polytron IR

.3 Junction box c/w terminals. Ensure correct conduit entry locations for ceiling mounted detectors.

.4 Extension Box HHT-T for inaccessible detectors

.5 Extension Box HHT-H for inaccessible detectors

.6 HART programming cable for Polytron IR

## 2.4 SAMPLE PANEL

.1 The sample panel shall be an eductor based sampling system including the following:

.1 One instrument air connection.

.2 Solenoids to allow purging of the inlet line with instrument air controlled from the DCS.

.1 Solenoids to be 120 VAC rated.

.3 A pushbutton for manual purging with a signal going to the DCS.

.1 Pushbutton to be heavy-duty oiltight, operator flush, black, with 1-NO and 1-NC contacts rated 120 VAC, 5 A rated.

.4 Filters to remove water from the sample inlet

.5 A low flow switch for each sample line with signals going to the DCS.

.1 Flow switch to be 120 VAC, 5 A rated.

.6 Two gas detector units configured as per the drawings.

.7 A pressure regulator to drop instrument air pressure down to eductor operating pressure.

.8 NEMA 4 enclosure

.9 Manufactured by a CSA approved panel shop in accordance with 40 95 13.

## 2.5 SAMPLE AND CALIBRATION TUBING

.1 The sample tubing shall be 1/4” (8mm) stainless steel tubing.

.2 The sample tubing hung into the wet well shall be 8mm (1/4") flexible Teflon tubing.

.3 The calibration tubing shall be 6mm (1/8”) stainless steel tubing.

.4 Provide supports as required for all metal tubing.

## 2.6 AUDIBLE SIGNAL DEVICES - UNCLASSIFIED

.1 Requirements:

| | | |
|---|---|---|
| .1 | Approvals: | CSA or cUL |
| .2 | Type: | Vibrating grille |
| .3 | Enclosure: | Corrosion resistant type 4X |
| .4 | Voltage: | 120 VAC |
| .5 | Sound level at 3 m (10 ft) | 103 db (Adjustable) |
| .6 | Maximum current draw | less than 0.2 A |
| .7 | Mounting: | Surface mount on wall |
| .8 | Manufacturer and Model: | |
| | .1 Edwards 876 series | |
| | .2 Or approved equal in accordance with B6. | |

.2 Coordinate gas alarm horn sound with fire alarm system horns to have a distinctly different sound for gas alarm horns.

## 2.7 AUDIBLE SIGNAL DEVICES – CLASS I, ZONE 2

.1 Requirements:

| | | |
|---|---|---|
| .1 | Approvals: | CSA or cUL |
| .2 | Type: | Explosion Proof |
| .3 | Rating: | Class I, Zone 2, Group IIA |
| .4 | Enclosure: | Corrosion resistant type 4X |
| .5 | Voltage: | 120 VAC |
| .6 | Sound level at 3 m (10 ft) | 97 db |
| .7 | Maximum current draw | less than 0.2 A |
| .8 | Mounting: | Surface mount on wall |
| .9 | Manufacturer and Model: | |
| | .1 Edwards 878EX series | |
| | .2 Or approved equal in accordance with B6. | |

.2 Coordinate gas alarm horn sound with fire alarm system horns to have a distinctly different sound for gas alarm horns.

**2.8 VISUAL ALARM SIGNAL DEVICES - UNCLASSIFIED**

.1 Requirements:

| | | |
|---|---|---|
| .1 | Approvals: | CSA or cUL |
| .2 | Type: | Strobe, flashing |
| .3 | Enclosure: | Corrosion resistant Type 4X |
| .4 | Voltage: | 120 VAC |
| .5 | Light Intensity: | 800,000 candela or greater |
| .6 | Colour: | Red |
| .7 | Maximum current draw: | less than 0.2 A |
| .8 | Mounting: | Surface mount on wall |
| .9 | Provide mounting brackets as required. | |
| .10 | Manufacturer and Model: | |
| | .1 Edwards 105HIST series | |
| | .2 Or approved equal in accordance with B6. | |

.2 Means provided to synchronize flashes within corridors or rooms in the same field of view.

.3 Provide a sign adjacent to the strobe, readable from 10m indicating:

STROBE INDICATES HAZARDOUS GAS DETECTED
IF ACTIVATED LEAVE AREA IMMEDIATELY

**2.9 VISUAL ALARM SIGNAL DEVICES – CLASS I, ZONE 1**

.1 Requirements:

| | | |
|---|---|---|
| .1 | Approvals: | CSA or cUL |
| .2 | Type: | Explosion Proof, Strobe, flashing |
| .3 | Classification: | Class I, Zone 1 (Div 1), Group IIA (D) |
| .4 | Enclosure: | Corrosion resistant Type 4X |
| .5 | Voltage: | 120 VAC |
| .6 | Light Intensity: | 800,000 candela or greater |
| .7 | Colour: | Red |
| .8 | Maximum current draw: | less than 0.2 A |
| .9 | Mounting: | Surface mount on wall |
| .10 | Provide mounting brackets as required. | |
| .11 | Manufacturer and Model: | |
| | .1 Edwards 116EX series | |
| | .2 Or approved equal in accordance with B6. | |

.2 Means provided to synchronize flashes within corridors or rooms in the same field of view.

.3 Provide a sign adjacent to the strobe, readable from 10m indicating:

STROBE INDICATES HAZARDOUS GAS DETECTED
IF ACTIVATED LEAVE AREA IMMEDIATELY

## Part 3 Execution

### 3.1 INSTALLATION

.1 All equipment shall be mounted in accordance with manufacturer's recommendations.

.2 Install gas detection equipment as per location drawings and installation details.

.3 Install a lamacoid nameplate directly on or adjacent to equipment with equipment name and description.

.4 Install remote calibration stations on wall at 1.5m above finished floor or grating. Install lamacoid on wall next to station with description (eg. G501-AP01 REMOTE CALIBRATION STATION FOR G501-AT01)

.5 Equipment installed in Category 2 wet locations shall be mounted a minimum of 12 mm from supporting surface as per the Canadian Electrical Code Section 22.

.6 Locations of all field instruments are subject to modification by the Contract Administrator who reserves the right to move any item up to 3 meters from the position shown, without change to the contract price, provided notice is given before the related work has commenced.

.7 Exact locations of all field instruments shall be site determined by the Contractor to the satisfaction of the Contract Administrator to ensure proper operation of the device.

### 3.2 CALIBRATION

.1 Calibrate all gas detection sensors.

### 3.3 TESTING

.1 Test the sound levels of notification horns in the areas covered by the horns. Provide a report indicating the ambient sound level, and the average, maximum, and minimum horn sound levels in dB.

**END OF SECTION**